

PATENT ABSTRACTS OF JAPAN

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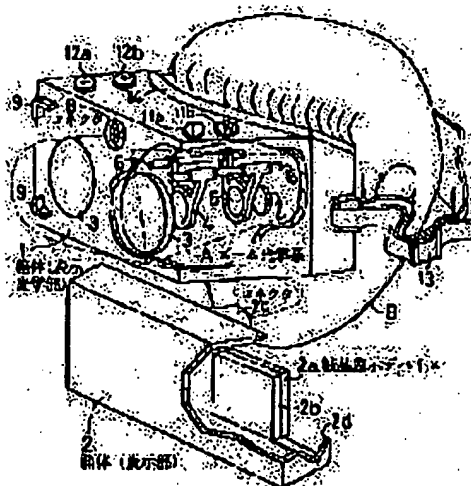
(54) HEAD MOUNT DISPLAY

(57)Abstract:

PURPOSE: To deal with any planar display consisting of a liquid crystal, etc., by means of a head mount display attached to the head of a user and for viewing a video, etc.

CONSTITUTION: An enclosure 1 (display optical part) housing a pair of left/right zoom optical systems A is provided with a zoom drive means and a focus drive means moving a required lens in the direction of an optical axis along guide bar 6 in the zoom optical systems A, and is provided with projections 9 for fixing the enclosure (display part) 2 provided with a pair of left/right liquid crystal devices 2a, lighting devices 2b, etc., so as to correspond to a pair of the left/right zoom optical systems A in front of it and the display optical part

1 is attachable/detachable to the display part 2, and for electrically connecting both parts, a connector 8 is provided on the display optical part 1, and the connector 2c is provided on the display part 2 respectively, and they are used as a detection means of loading.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] It fixes to a user's head and this invention relates to the head mount display which can appreciate an image etc.

[0002]

[Description of the Prior Art] It has conventionally the graphic display device which achieved right-and-left independence, a user's head was equipped, and the so-called head mount display with refreshable special images, such as 3-dimensional scenography, was in the image list. This head mount display consists of display optical system for expanding the display which mainly displays an image, and this display to suitable magnitude, and showing it to a user. And flat-surface displays, such as a liquid crystal display, were used for this display.

[0003]

[Problem(s) to be Solved by the Invention] By the way, although the sufficient number of pixels required for a display now was not obtained, even if flat-surface displays, such as a liquid crystal display used for said display, were head mount displays which are progressing by rapid progress, therefore offer the today highest definition image, a possibility of becoming stale was after half a year.

[0004] This invention aims at providing the advance of a flat-surface display with the head mount display which can respond flexibly in view of the trouble of the above-mentioned conventional example.

[0005] Moreover, it is usable also as a compound eye camera also as a binocular, and this invention aims at offering the head mount display whose operability improved.

[0006]

[Means for Solving the Problem] In order to attain the above-mentioned object, the 1st box with which the display means corresponding to each eye of right and left of a user and this display means are expanded, it has the display optical means which a user can observe, it fixed to a user's head, and this display optical means was carried in the head mount display which can appreciate an image, voice, etc., and the 2nd box with which this display means was carried make this invention disengageable.

[0007] Moreover, corresponding to each eye of right and left of a user, as for this display optical means, a user has the display optical means which can observe a photographic subject. As opposed to the 1st box with which a focus adjustment means by which to [near just before the display optical means] the body of the method of infinite distance could focus was formed in this display optical means, and this display optical means was carried Wearing at least of one side of the 2nd box with the display means of the right and left corresponding to the optical means of said right and left and the 3rd box with the image pick-up means corresponding to the optical means of these right and left is enabled. Moreover, a detection means to detect having been equipped with this display optical means and this display means is established, and when it detects having been equipped with this display means by this detection means, this focus adjustment means may be made to perform focus adjustment to the 1st box in which this display optical means was carried so that a focus may suit this display means.

[0008] Moreover, in this display optical means, it has a dilation ratio modification means (zoom device) by which a dilation ratio can be changed. It has the connecting means which connects both boxes to the 2nd box with which this display means was carried, and the 1st box in which this display optical means was carried electrically, respectively. If it detects having a dilation ratio decision means to determine the dilation ratio of this display optical means as the 1st box in which this display optical means was carried according to the magnitude of this display means, and having been equipped with this display means by this detection means While changing the dilation ratio of this display optical means into the dilation ratio for which this dilation ratio decision means asked with this dilation ratio modification means, said focus adjustment means of this display optical means may be made to be made to perform focus adjustment so that a focus may suit this display means.

[0009]

[Function] Since the head mount display of the above configuration enabled it to separate the 1st box with which the display optical means was carried, and the 2nd box with which the display means was carried, even if it is a display means carrying the flat-surface device constituted how, they are exchanged, and become usable.

[0010] Moreover, it becomes usable also as a binocular, or a head mount display or a compound eye camera to the 1st box with which the display optical means was carried by equipping with the 2nd box with a display means on either side, or the 3rd box with the image pick-up means corresponding to the optical means of these right and left. Moreover, since it detects having equipped the display optical means with the display means and a focus adjustment means carries out focus doubling, when using it as a head mount display, troublesome actuation of a user called focus doubling to a display means is made unnecessary. Moreover, if wearing of a display means is detected, since it will change into the dilation ratio which the dilation ratio decision means asked for the dilation ratio of the display optical means which has a zoom device and focus doubling will carry out to a display means with a focus adjustment means, the need that make a response possible even when the magnitude of the flat-surface device carried in a display means exchange changes to the conventional thing, and a user is conscious of it loses.

[0011]

[Example] Hereafter, the 1st example of this invention is explained based on drawing 1. In drawing, 1 is the box (only henceforth a "display optical department") which dedicated to the interior the zoom optical system A which can focus from contiguity to infinite distance one pair of right and left. 2 is the box (only henceforth a "display") which has the memory section which remembered the magnitude information on liquid crystal display device 2a to be a left Uichi pair for liquid crystal display device 2a and lighting system 2b which reproduce an image inside, and which is not illustrate, and the actuation circuit which drives this liquid crystal display device 2a and lighting system 2b, and has connector 2c for connect with this display optical department 1 electrically further.

[0012] It is a focus lens for adjusting a zoom lens and a focus for 3 changing the objective lens of the zoom optical system A, and for 4 and 5 changing the dilation ratio of the zoom optical system A, respectively, and is held movable in the direction of an optical axis with the guide bar 6. in order [moreover,] to make the zoom optical system A move a zoom lens 3 and the focus lens 5 in the direction of an optical axis, respectively -- electromagnetism, such as a motor, -- it has the zoom driving means and focus driving means which consist of a driving means and which are not illustrated. 7 is the ocular of the zoom optical system A. 8 is a connector for connecting with connector 2c of a display 2 electrically. And in this example, magnitude information on liquid crystal display device 2a shall be transmitted to supply of the detection, the power source to a display 2, and the image source of whether this display optical department 1 and this display 2 are connected through Connectors 8 and 2c, and the display optical department 1.

[0013] 9 is the lug section for fitting in and fixing to 2d of crevices formed in the side face of a display 2, when attaching a display 2 in the front face of said display optical department 1. 11a and 11b are the zoom tele carbon buttons and zoom wide carbon buttons which were prepared in the top face of said display optical department 1, respectively, by being operated, can move said zoom lens 4 by said zoom

driving means, and can be made now into a desired dilation ratio. Similarly 12a and 12b are focal carbon buttons, by being operated, can move said focus lens 5 to a front or the back by said focus driving means, and can double a focus now with a desired photographic subject. 13 is a strap for fixing the display optical department 1 to User's B head, and 14 is the rubber member prepared in the rising wood of the display optical department 1, and he is trying for User's B face not to become painful at the time of head immobilization.

[0014] In addition, it shall have a dilation ratio decision means which is not illustrated to determine the dilation ratio of the zoom optical system A as the display optical department 1 from the magnitude information on the diopter amendment means for amending the diopter of a voice playback means by which it is not illustrated for reproducing the connector and voice for delivering and receiving the exterior, the image source, and the voice source which are not illustrated, and a user, and liquid crystal device 2a.

[0015] Actuation of this example of the above configuration is explained. In addition, unless it refuses especially, the system controller which was formed in the display optical department 1 and which is not illustrated shall perform all actuation. First, the charge of the electric power switch with which the display optical department 1 is not illustrated confirms whether connector 2c of a display 2 is connected to the connector 8. And if connection of connector 2c of a connector 8 and a display 2 is not detected, it shifts to binocular mode.

[0016] In binocular mode, by operating zoom tele carbon button 11a or zoom wide carbon button 11b, and the focal carbon buttons 12a and 12b, a zoom driving means and a focus driving means are driven, and the display optical department 1 can be used as a binocular which can observe a desired photographic subject in desired magnitude.

[0017] On the other hand, when connection of connector 2c of a connector 8 and a display 2 is detected, it shifts to a display mode, and actuation of the zoom carbon buttons 11a and 11b and the focal carbon buttons 12a and 12b is disregarded. And said dilation ratio decision means which is not illustrated determines the zoom scale factor which should set up the magnitude information on liquid crystal display 2a according to reception and its information from the memory section of a display 2. Next, a zoom lens 4 is moved in the direction of an optical axis by the zoom driving means, and it is made said zoom scale factor. Subsequently, in order to double a focus with liquid crystal display 2a of a display 2, it asks for the location of the focus lens 5 which should be set up from this zoom scale factor, and the focus lens 5 is moved by the focus driving means.

[0018] It can see, after the user has had the focus in predetermined magnitude in liquid crystal display 2a by the above actuation. Moreover, the power source and the image source for driving liquid crystal display 2a and a lighting system are supplied to said a series of actuation and coincidence through Connectors 8 and 2c, and an image is reproduced by liquid crystal display 2a. Therefore, a user can appreciate the image reproduced by liquid crystal display 2a.

[0019] And according to this example, there is the following effectiveness.

(1) Since the ***** connector serves as a detection means to detect that the display optical department 1 and the display 2 were electrically attached in the display 2 by the display optical department 1, a device is easy.

(2) Since the display optical department 1 and the display 2 are electrically formed in the box of a display 2, and one while collecting a ***** connector to one place, a user becomes usable only by attaching a display 2 in the display optical department 1.

[0020] (3) Since supply of a power source and the image source is performed from the display optical department 1 to the display 2 and the minimum configuration for displaying an image on a display 2 may be used, it is [the cost of a display 2] easy and it is possible.

[0021] In addition, in a display mode, after moving a zoom lens 4 and the focus lens 5 to a position, even if modification of a zoom scale factor is possible by operating the zoom carbon buttons 11a and 11b, it is good, and appreciation of an image is attained in a user's favorite magnitude in this case. Moreover, the memory section of a display 2, a dilation ratio decision means, and a detection means are abandoned, and the hand control by a user's operating physical force may be made to perform a zoom

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driving means and a focus driving means. in this case -- since a device becomes easy -- cost -- being easy -- electromagnetism, such as a motor, -- since it is unnecessary, a driving gear can lessen power consumption. Moreover, the lever for a change which can be set as the zoom ratio and focus location where a display 2 can appreciate a zoom lens and a focus lens in moderate magnitude as said dilation ratio decision means in this case is prepared, and a user may be made to change when a display 2 is attached in the display optical department 1. If it does in this way, the actuation when using it as a head mount display will become easy.

[0022] Drawing 2 shows the 2nd example of this invention. Although 21 is the box (display optical department) which dedicated zoom optical system in drawing and main configurations , functions , etc. of the 1st example of the above-mentioned and the interior are the same , it has the connector by which it is not illustrate for connect with the image pick-up section and the electric target which the ocular which is not illustrate is removable and do a postscript . 22 is the image pick-up section, and it exchanges for the ocular of this display optical department 21, and wearing of it is attained, and it has formed the image sensor 23 which is an optoelectric transducer in the interior one pair of right and left. 24 is a light filter containing an optical low pass filter and IR cut-off filter, and is arranged at the anterior part of this image sensor 23. 25 is an electrical circuit substrate containing the digital disposal circuit for changing into a predetermined video signal the signal acquired with the actuation circuit which drives this image sensor 23, and the image sensor 23. In addition, in this example, this digital disposal circuit shall change the signal of the image sensor 23 on either side into an NTSC signal, respectively, and shall change the NTSC signal into the NTSC signal serially located in a line by turns for every field.

[0023] 26 is the connector which connects with said display optical department 21 electrically, and a power source is supplied to the image pick-up section 22 from the output and the display optical department 21 of the driving signal which drives a focus driving means from the image pick-up section 22 to detection of the display optical department 21 and the image pick-up section 22 being connected, and the display optical department 21. 27 is a release carbon button. 28 is an output connector for outputting to the record means or the playback means 29 of mentioning later the video signal acquired in the image pick-up section 22. 3-dimensional scenography is a refreshable playback means, and 29 has the plug 30 for connecting with this output connector 28. Moreover, it shall have a fixed means of the display optical department 21 and the image pick-up section 22 to fix the display optical department 21 and the image pick-up section 22 to either at least at a position, respectively. In addition, the record means which can record 3-dimensional scenography and which is not illustrated may be connected to this output connector 28.

[0024] Actuation of this example of the above configuration is explained. First, the charge of the electric power switch which the display optical department 21 does not illustrate confirms whether the image pick-up section 22 is attached. If wearing of the image pick-up section 22 is not detected, it goes into binocular mode like the 1st example of the above-mentioned, and when wearing of the image pick-up section 22 is detected, it goes into image pick-up mode, and actuation of the focal carbon button which is not illustrated is disregarded.

[0025] Moreover, in photography mode, it becomes possible to change a zoom ratio by operating the zoom carbon button which is not illustrated. And in photography mode, the so-called mountain-climbing method which compares the integral value of the high frequency component of each image sensor 23 at that time, the focus lens which is not probably illustrated through a connector 26 is driven forward and backward, detects the focus gap direction by the size of the output, and drives the focus lens so that the high frequency component may serve as maximum performs focus doubling. Subsequently, if the release carbon button 27 is pushed, the output of the image sensor 23 on either side will be changed into a predetermined video signal by the digital disposal circuit, and will be outputted from the output connector 28. And if the playback means 29 is connected to this output connector 28, appreciation of 3-dimensional scenography will be attained. Moreover, if the record means which is not illustrated by this output connector 28 is connected, it will become recordable [3-dimensional scenography].

[0026] Thus, there is the following effectiveness in this example. That is, where the ocular of the display optical department 21 is removed, since the image pick-up section 22 is made to be attached, the

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primary image formation of the zoom optical system of the display optical department 21 can be led to an image sensor 23, and simplification becomes possible about the configuration of the image pick-up section 22.

[0027] In addition, in this example, the remote control which can be operated by remote control is formed independently [the release carbon button 27], and actuation of an image sensor 23 may be made to be performed by operating the remote control. In this case, actuation becomes possible in the location which the user left.

[0028]

[A response of invention and an example] In the above example, the boxes 1 and 21 which dedicated the zoom optical system A are equivalent to the 1st box with which the display optical means of this invention was carried. The box 2 which prepared liquid crystal display device 2a, lighting-system 2b, etc. is equivalent to the 2nd box with which the display means of this invention was carried. The focus driving means which consists of a driving means is equivalent to the focus adjustment means of this invention. electromagnetism, such as a motor made to move the focus lens 5 in the direction of an optical axis with a guide bar 6, -- The image sensor 23 which is an optoelectric transducer, a light filter 24, and the image pick-up section 22 which prepared the electrical circuit substrate 25 grade are equivalent to the 3rd box with the image pick-up means of this invention. In order to connect with connector 2c prepared in the rear face of a box 2, it is a detection means by which the connector 8 prepared in the front face of a box 1 detects having been equipped with the box 2 of this invention, and the zoom lens 4 of the zoom optical system A is equivalent to the dilation ratio modification means of a display optical means.

[0029] In addition, although the above is the response relation between each configuration of an example, and each configuration of this invention, if this invention is the configuration that the function which it is not limited to the configuration of these examples and shown by the claim, or the function which the configuration of an example has can be attained, it cannot be overemphasized that you may be what kind of thing.

[0030]

[Effect of the Invention] This invention can appreciate a high definition image only by exchanging the conventional display material for the display material carried in the higher definition display device, when a higher definition display device is developed by having made disengageable the 1st box with which the display optical means was carried, and the 2nd box with which the display means was carried, as explained above.

[0031] Moreover, it becomes usable suitably also as a binocular, a head mount display, or a compound eye camera by having formed a focus adjustment means by which to [near just before the display optical means] the body of the method of infinite distance could focus in the display optical means, and having enabled wearing of at least one side of the 2nd box with a display means, and the 3rd box with an image pick-up means to the 1st box with which the display optical means was carried.

[0032] moreover, to the 1st box in which this display optical means was carried By establishing a detection means to detect having been equipped with this display optical means and the display means, and this focus adjustment means performing focus adjustment so that a focus may suit this display means if it detects having been equipped with this display means by this detection means When equipping a display optical means with a display means, focus doubling to this display means becomes [a user] unnecessary, and actuation becomes easy.

[0033] Moreover, in this display optical means, it has a dilation ratio modification means (zoom means) by which a dilation ratio can be changed. It has the connecting means which connects both boxes to the 2nd box with which this display means was carried, and the 1st box in which this display optical means was carried electrically, respectively. If it detects having a dilation ratio decision means to determine the dilation ratio of this display optical means as the 1st box in which this display optical means was carried according to the magnitude of this display means, and having been equipped with this display means by this detection means By said focus adjustment means of this display optical means performing focus adjustment so that a focus may suit this display means, while changing the dilation ratio of this display

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optical means into the dilation ratio for which this dilation ratio decision means asked with this dilation ratio modification means When appreciation of an image is attained in predetermined magnitude and a display optical means is not equipped with the display means, without a user being conscious of the magnitude of the display device with which it equips, it becomes usable as a binocular with a zoom.

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TECHNICAL FIELD

[Industrial Application] It fixes to a user's head and this invention relates to the head mount display which can appreciate an image etc.

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PRIOR ART

[Description of the Prior Art] It has conventionally the graphic display device which achieved right-and-left independence, a user's head was equipped, and the so-called head mount display with refreshable special images, such as 3-dimensional scenography, was in the image list. This head mount display consists of display optical system for expanding the display which mainly displays an image, and this display to suitable magnitude, and showing it to a user. And flat-surface displays, such as a liquid crystal display, were used for this display.

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EFFECT OF THE INVENTION

[Effect of the Invention] This invention can appreciate a high definition image only by exchanging the conventional display material for the display material carried in the higher definition display device, when a higher definition display device is developed by having made disengageable the 1st box with which the display optical means was carried, and the 2nd box with which the display means was carried, as explained above.

[0031] Moreover, it becomes usable suitably also as a binocular, a head mount display, or a compound eye camera by having formed a focus adjustment means by which to [near just before the display optical means] the body of the method of infinite distance could focus in the display optical means, and having enabled wearing of at least one side of the 2nd box with a display means, and the 3rd box with an image pick-up means to the 1st box with which the display optical means was carried.

[0032] moreover, to the 1st box in which this display optical means was carried By establishing a detection means to detect having been equipped with this display optical means and the display means, and this focus adjustment means performing focus adjustment so that a focus may suit this display means if it detects having been equipped with this display means by this detection means When equipping a display optical means with a display means, focus doubling to this display means becomes [a user] unnecessary, and actuation becomes easy.

[0033] Moreover, a dilation ratio modification means by which a dilation ratio can be changed at this display optical means

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] By the way, although the sufficient number of pixels required for a display now was not obtained, even if flat-surface displays, such as a liquid crystal display used for said display, were head mount displays which are progressing by rapid progress, therefore offer the today highest definition image, a possibility of becoming stale was after half a year.

[0004] This invention aims at providing the advance of a flat-surface display with the head mount display which can respond flexibly in view of the trouble of the above-mentioned conventional example.

[0005] Moreover, it is usable also as a compound eye camera also as a binocular, and this invention aims at offering the head mount display whose operability improved.

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OPERATION

[Function] Since the head mount display of the above configuration enabled it to separate the 1st box with which the display optical means was carried, and the 2nd box with which the display means was carried, even if it is a display means carrying the flat-surface device constituted how, they are exchanged, and become usable.

[0010] Moreover, it becomes usable also as a binocular, or a head mount display or a compound eye camera to the 1st box with which the display optical means was carried by equipping with the 2nd box with a display means on either side, or the 3rd box with the image pick-up means corresponding to the optical means of these right and left. Moreover, since it detects having equipped the display optical means with the display means and a focus adjustment means carries out focus doubling, when using it as a head mount display, troublesome actuation of a user called focus doubling to a display means is made unnecessary. Moreover, if wearing of a display means is detected, since it will change into the dilation ratio which the dilation ratio decision means asked for the dilation ratio of the display optical means which has a zoom device and focus doubling will carry out to a display means with a focus adjustment means, the need that make a response possible even when the magnitude of the flat-surface device carried in a display means exchange changes to the conventional thing, and a user is conscious of it loses.

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MEANS

[Means for Solving the Problem] In order to attain the above-mentioned object, the 1st box with which the display means corresponding to each eye of right and left of a user and this display means are expanded, it has the display optical means which a user can observe, it fixed to a user's head, and this display optical means was carried in the head mount display which can appreciate an image, voice, etc., and the 2nd box with which this display means was carried make this invention disengageable.

[0007] Moreover, corresponding to each eye of right and left of a user, as for this display optical means, a user has the display optical means which can observe a photographic subject. As opposed to the 1st box with which a focus adjustment means by which to [near just before the display optical means] the body of the method of infinite distance could focus was formed in this display optical means, and this display optical means was carried Wearing at least of one side of the 2nd box with the display means of the right and left corresponding to the optical means of said right and left and the 3rd box with the image pick-up means corresponding to the optical means of these right and left is enabled. Moreover, a detection means to detect having been equipped with this display optical means and this display means is established, and when it detects having been equipped with this display means by this detection means, this focus adjustment means may be made to perform focus adjustment to the 1st box in which this display optical means was carried so that a focus may suit this display means.

[0008] Moreover, in this display optical means, it has a dilation ratio modification means (zoom device) by which a dilation ratio can be changed. It has the connecting means which connects both boxes to the 2nd box with which this display means was carried, and the 1st box in which this display optical means was carried electrically, respectively. If it detects having a dilation ratio decision means to determine the dilation ratio of this display optical means as the 1st box in which this display optical means was carried according to the magnitude of this display means, and having been equipped with this display means by this detection means While changing the dilation ratio of this display optical means into the dilation ratio for which this dilation ratio decision means asked with this dilation ratio modification means, said focus adjustment means of this display optical means may be made to be made to perform focus adjustment so that a focus may suit this display means.

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EXAMPLE

[Example] Hereafter, the 1st example of this invention is explained based on drawing 1. In drawing, 1 is the box (only henceforth a "display optical department") which dedicated to the interior the zoom optical system A which can focus from contiguity to infinite distance one pair of right and left. 2 is the box (only henceforth a "display") which has the memory section which remembered the magnitude information on liquid crystal display device 2a to be a left Uichi pair for liquid crystal display device 2a and lighting system 2b which reproduce an image inside, and which is not illustrate, and the actuation circuit which drives this liquid crystal display device 2a and lighting system 2b, and has connector 2c for connect with this display optical department 1 electrically further.

[0012] It is a focus lens for adjusting a zoom lens and a focus for 3 changing the objective lens of the zoom optical system A, and for 4 and 5 changing the dilation ratio of the zoom optical system A, respectively, and is held movable in the direction of an optical axis with the guide bar 6. in order [moreover,] to make the zoom optical system A move a zoom lens 3 and the focus lens 5 in the direction of an optical axis, respectively -- electromagnetism, such as a motor, -- it has the zoom driving means and focus driving means which consist of a driving means and which are not illustrated. 7 is the ocular of the zoom optical system A. 8 is a connector for connecting with connector 2c of a display 2 electrically. And in this example, magnitude information on liquid crystal display device 2a shall be transmitted to supply of the detection, the power source to a display 2, and the image source of whether this display optical department 1 and this display 2 are connected through Connectors 8 and 2c, and the display optical department 1.

[0013] 9 is the lug section for fitting in and fixing to 2d of crevices formed in the side face of a display 2, when attaching a display 2 in the front face of said display optical department 1. 11a and 11b are the zoom tele carbon buttons and zoom wide carbon buttons which were prepared in the top face of said display optical department 1, respectively, by being operated, can move said zoom lens 4 by said zoom driving means, and can be made now into a desired dilation ratio. Similarly 12a and 12b are focal carbon buttons, by being operated, can move said focus lens 5 to a front or the back by said focus driving means, and can double a focus now with a desired photographic subject. 13 is a strap for fixing the display optical department 1 to User's B head, and 14 is the rubber member prepared in the rising wood of the display optical department 1, and he is trying for User's B face not to become painful at the time of head immobilization.

[0014] In addition, it shall have a dilation ratio decision means which is not illustrated to determine the dilation ratio of the zoom optical system A as the display optical department 1 from the magnitude information on the diopter amendment means for amending the diopter of a voice playback means by which it is not illustrated for reproducing the connector and voice for delivering and receiving the exterior, the image source, and the voice source which are not illustrated, and a user, and liquid crystal device 2a.

[0015] Actuation of this example of the above configuration is explained. In addition, unless it refuses especially, the system controller which was formed in the display optical department 1 and which is not illustrated shall perform all actuation. First, the charge of the electric power switch with which the

display optical department 1 is not illustrated confirms whether connector 2c of a display 2 is connected to the connector 8. And if connection of connector 2c of a connector 8 and a display 2 is not detected, it shifts to binocular mode.

[0016] In binocular mode, by operating zoom tele carbon button 11a or zoom wide carbon button 11b, and the focal carbon buttons 12a and 12b, a zoom driving means and a focus driving means are driven, and the display optical department 1 can be used as a binocular which can observe a desired photographic subject in desired magnitude.

[0017] On the other hand, when connection of connector 2c of a connector 8 and a display 2 is detected, it shifts to a display mode, and actuation of the zoom carbon buttons 11a and 11b and the focal carbon buttons 12a and 12b is disregarded. And said dilation ratio decision means which is not illustrated determines the zoom scale factor which should set up the magnitude information on liquid crystal display 2a according to reception and its information from the memory section of a display 2. Next, a zoom lens 4 is moved in the direction of an optical axis by the zoom driving means, and it is made said zoom scale factor. Subsequently, in order to double a focus with liquid crystal display 2a of a display 2, it asks for the location of the focus lens 5 which should be set up from this zoom scale factor, and the focus lens 5 is moved by the focus driving means.

[0018] It can see, after the user has had the focus in predetermined magnitude in liquid crystal display 2a by the above actuation. Moreover, the power source and the image source for driving liquid crystal display 2a and a lighting system are supplied to said a series of actuation and coincidence through Connectors 8 and 2c, and an image is reproduced by liquid crystal display 2a. Therefore, a user can appreciate the image reproduced by liquid crystal display 2a.

[0019] And according to this example, there is the following effectiveness.

(1) Since the ***** connector serves as a detection means to detect that the display optical department 1 and the display 2 were electrically attached in the display 2 by the display optical department 1, a device is easy.

(2) Since the display optical department 1 and the display 2 are electrically formed in the box of a display 2, and one while collecting a ***** connector to one place, a user becomes usable only by attaching a display 2 in the display optical department 1.

[0020] (3) Since supply of a power source and the image source is performed from the display optical department 1 to the display 2 and the minimum configuration for displaying an image on a display 2 may be used, it is [the cost of a display 2] easy and it is possible.

[0021] In addition, in a display mode, after moving a zoom lens 4 and the focus lens 5 to a position, even if modification of a zoom scale factor is possible by operating the zoom carbon buttons 11a and 11b, it is good, and appreciation of an image is attained in a user's favorite magnitude in this case. Moreover, the memory section of a display 2, a dilation ratio decision means, and a detection means are abandoned, and the hand control by a user's operating physical force may be made to perform a zoom driving means and a focus driving means. in this case -- since a device becomes easy -- cost -- being easy -- electromagnetism, such as a motor, -- since it is unnecessary, a driving gear can lessen power consumption. Moreover, the lever for a change which can be set as the zoom ratio and focus location where a display 2 can appreciate a zoom lens and a focus lens in moderate magnitude as said dilation ratio decision means in this case is prepared, and a user may be made to change when a display 2 is attached in the display optical department 1. If it does in this way, the actuation when using it as a head mount display will become easy.

[0022] Drawing 2 shows the 2nd example of this invention. Although 21 is the box (display optical department) which dedicated zoom optical system in drawing and main configurations , functions , etc. of the 1st example of the above-mentioned and the interior are the same , it has the connector by which it is not illustrate for connect with the image pick-up section and the electric target which the ocular which is not illustrate is removable and do a postscript . 22 is the image pick-up section, and it exchanges for the ocular of this display optical department 21, and wearing of it is attained, and it has formed the image sensor 23 which is an optoelectric transducer in the interior one pair of right and left. 24 is a light filter containing an optical low pass filter and IR cut-off filter, and is arranged at the anterior

/7

part of this image sensor 23. 25 is an electrical circuit substrate containing the digital disposal circuit for changing into a predetermined video signal the signal acquired with the actuation circuit which drives this image sensor 23, and the image sensor 23. In addition, in this example, this digital disposal circuit shall change the signal of the image sensor 23 on either side into an NTSC signal, respectively, and shall change the NTSC signal into the NTSC signal serially located in a line by turns for every field.

[0023] 26 is the connector which connects with said display optical department 21 electrically, and a power source is supplied to the image pick-up section 22 from the output and the display optical department 21 of the driving signal which drives a focus driving means from the image pick-up section 22 to detection of the display optical department 21 and the image pick-up section 22 being connected, and the display optical department 21. 27 is a release carbon button. 28 is an output connector for outputting to the record means or the playback means 29 of mentioning later the video signal acquired in the image pick-up section 22. 3-dimensional scenography is a refreshable playback means, and 29 has the plug 30 for connecting with this output connector 28. Moreover, it shall have a fixed means of the display optical department 21 and the image pick-up section 22 to fix the display optical department 21 and the image pick-up section 22 to either at least at a position, respectively. In addition, the record means which can record 3-dimensional scenography and which is not illustrated may be connected to this output connector 28.

[0024] Actuation of this example of the above configuration is explained. First, the charge of the electric power switch which the display optical department 21 does not illustrate confirms whether the image pick-up section 22 is attached. If wearing of the image pick-up section 22 is not detected, it goes into binocular mode like the 1st example of the above-mentioned, and when wearing of the image pick-up section 22 is detected, it goes into image pick-up mode, and actuation of the focal carbon button which is not illustrated is disregarded.

[0025] Moreover, in photography mode, it becomes possible to change a zoom ratio by operating the zoom carbon button which is not illustrated. And in photography mode, the so-called mountain-climbing method which compares the integral value of the high frequency component of each image sensor 23 at that time, the focus lens which is not probably illustrated through a connector 26 is driven forward and backward, detects the focus gap direction by the size of the output, and drives the focus lens so that the high frequency component may serve as maximum performs focus doubling. Subsequently, if the release carbon button 27 is pushed, the output of the image sensor 23 on either side will be changed into a predetermined video signal by the digital disposal circuit, and will be outputted from the output connector 28. And if the playback means 29 is connected to this output connector 28, appreciation of 3-dimensional scenography will be attained. Moreover, if the record means which is not illustrated by this output connector 28 is connected, it will become recordable [3-dimensional scenography].

[0026] Thus, there is the following effectiveness in this example. That is, where the ocular of the display optical department 21 is removed, since the image pick-up section 22 is made to be attached, the primary image formation of the zoom optical system of the display optical department 21 can be led to an image sensor 23, and simplification becomes possible about the configuration of the image pick-up section 22.

[0027] In addition, in this example, the remote control which can be operated by remote control is formed independently [the release carbon button 27], and actuation of an image sensor 23 may be made to be performed by operating the remote control. In this case, actuation becomes possible in the location which the user left.

[0028]

[A response of invention and an example] In the above example, the boxes 1 and 21 which dedicated the zoom optical system A are equivalent to the 1st box with which the display optical means of this invention was carried. The box 2 which prepared liquid crystal display device 2a, lighting-system 2b, etc. is equivalent to the 2nd box with which the display means of this invention was carried. The focus driving means which consists of a driving means is equivalent to the focus adjustment means of this invention. electromagnetism, such as a motor made to move the focus lens 5 in the direction of an optical axis with a guide bar 6, -- The image sensor 23 which is an optoelectric transducer, a light filter

- 24, and the image pick-up section 22 which prepared the electrical circuit substrate 25 grade are equivalent to the 3rd box with the image pick-up means of this invention. In order to connect with connector 2c prepared in the rear face of a box 2, it is a detection means by which the connector 8 prepared in the front face of a box 1 detects having been equipped with the box 2 of this invention, and the zoom lens 4 of the zoom optical system A is equivalent to the dilation ratio modification means of a display optical means.

[0029] In addition, although the above is the response relation between each configuration of an example, and each configuration of this invention, if this invention is the configuration that the function which it is not limited to the configuration of these examples and shown by the claim, or the function which the configuration of an example has can be attained, it cannot be overemphasized that you may be what kind of thing.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view which the head mount display of the 1st example concerning this invention fractured the part.

[Drawing 2] It is the perspective view which the head mount display of the 2nd example of this invention fractured the part.

[Description of Notations]

A .. 1 Zoom optical system, 21 .. The box which dedicated zoom optical system (display optical department), 2 .. The box (display), 2a which have a liquid crystal display device etc. .. Liquid crystal display device, 2b [.. Zoom lens,] .. A lighting system, 2c .. A connector, 3 .. An objective lens, 4 5 [.. Zoom tele carbon button,] .. A focus lens, 8 .. A connector, 9 .. The lug section for immobilization, 11a 11b [.. An image sensor, 24 / .. A light filter, 26 / .. A connector, 27 / .. A release carbon button, 28 / .. An output connector, 29 / .. A playback means, 30 / .. Plug.] .. A zoom wide carbon button, 12a, 12b .. A focal carbon button, 22 .. The image pick-up section, 23

[Translation done.]

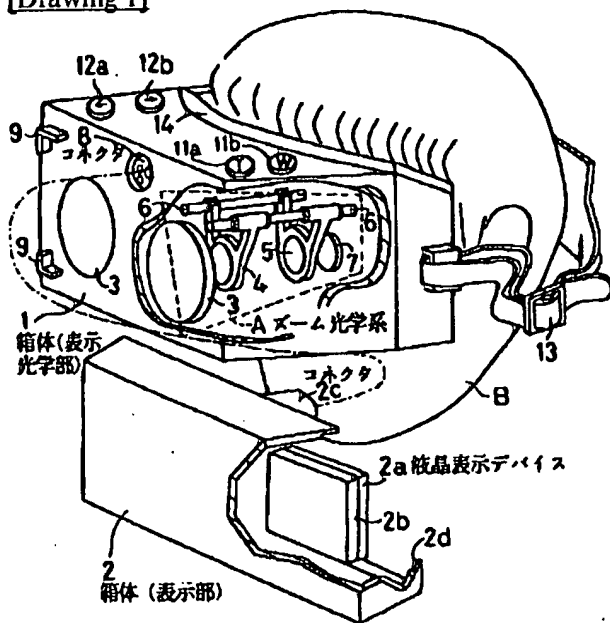
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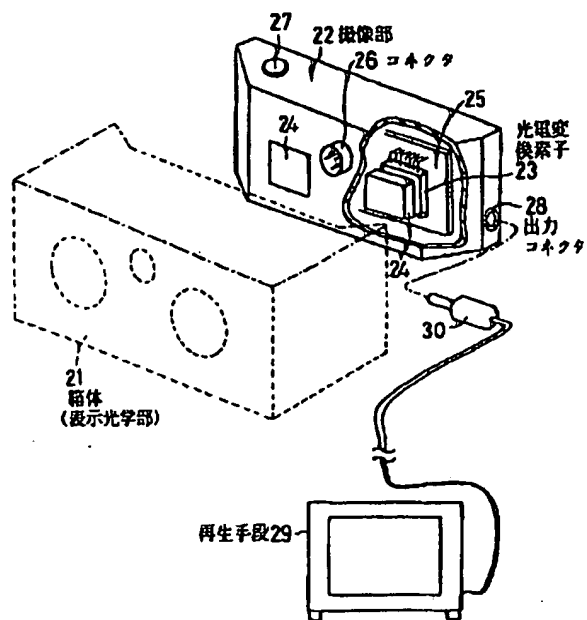
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DRAWINGS

[Drawing 1]



[Drawing 2]



[Translation done.]